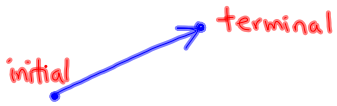
Day 50 - Vector Addition

Vector: directed line segment
- magnitude (length)
- direction



vector u: $\vec{u}$
vector v: $\vec{v}$

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Standard position: the directed line segment whose initial point is the origin.

Component form of a vector:

$\vec{v} = \langle v_1, v_2 \rangle$

the component form of a vector with initial point $P = (p_1, p_2)$ and terminal point $Q = (q_1, q_2)$ is

$\overrightarrow{PQ} = \langle q_1 - p_1, q_2 - p_2 \rangle = \langle v_1, v_2 \rangle = \vec{v}$

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Magnitude: $\|v\|$

$\|v\| = \sqrt{(q_1 - p_1)^2 + (q_2 - p_2)^2}$

$= \sqrt{(v_1)^2 + (v_2)^2}$

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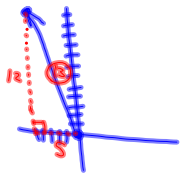
Ex 1: Find the component form and the magnitude of vector v that has an initial point (4,-7) and terminal point (-1,5).

$\vec{v} = \langle -1-4, 5--7 \rangle = \boxed{\langle -5, 12 \rangle}$

$\|v\| = \sqrt{(-5)^2 + (12)^2}$

$= \sqrt{25+144}$

$\boxed{= 13}$



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Ex 2: Find component form and magnitude of a vector with initial point (-1,4) and terminal point (1,1).

$\vec{v} = \langle 1--1, 1-4 \rangle = \boxed{\langle 2, -3 \rangle}$

$\|v\| = \sqrt{(2)^2 + (-3)^2}$

$= \sqrt{4+9}$

$\boxed{= \sqrt{13}}$

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Vector Addition / Scalar Multiplication

Let $u = \langle u_1, u_2 \rangle$ and $v = \langle v_1, v_2 \rangle$ be vectors and let K be a scalar ($a \mathbb{R}$)

Sum: $\vec{u} + \vec{v} = \langle u_1 + v_1, u_2 + v_2 \rangle$

Scalar multiplication:

$K\vec{u} = \langle Ku_1, Ku_2 \rangle$

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Ex 3: Let $\vec{v} = \langle -2, 5 \rangle$ and $\vec{w} = \langle 3, 4 \rangle$
Find:

(a) $2v = \langle -4, 10 \rangle$

(b) $v + w = \langle 1, 9 \rangle$

(c) $w - v = \langle 5, -1 \rangle$

(d) $v + 2w = \langle 4, 13 \rangle$

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Pg. 293 #1, 2, 3-13 odd, 21-26

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Oct 24-12:49 PM